

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 7438 (1985): Method for test for acid-insoluble content in iron, copper, tin, and bronze powders [MTD 25: Powder Metallurgical Materials and Products]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



Indian Standard

METHOD OF

TEST FOR ACID-INSOLUBLE CONTENT IN
IRON, COPPER, TIN AND BRONZE POWDERS

(*First Revision*)

UDC 669.1+669.3+669.356+669.6-492.2 : 543.726 (54.32)



© Copyright 1986

INDIAN STANDARDS INSTITUTION

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

METHOD OF TEST FOR ACID-INSOLUBLE CONTENT IN IRON, COPPER, TIN AND BRONZE POWDERS (First Revision)

Powder Metallurgical Materials and Products Sectional Committee,
SMDC 30

Chairman

DR R. VIJAYARAGHAVAN

Representing

Bhabha Atomic Research Centre, Bombay

Members

SHRI V. G. DATE (Alternate to Dr R. Vijayaraghavan)	
SHRI S. L. N. ACHARYULU	Ministry of Defence (R & D), New Delhi
SHRI N. MAITRA (Alternate)	
SHRI S. BANERJEE	Ministry of Defence (DGOF)
SHRI S. K. BASU	Indian Oxygen Ltd, Calcutta
SHRI R. BANERJEE (Alternate)	
DR R. D. BHARGAVA	Assotex Engineering Industries Ltd, Bombay
SHRI ANOOP SAXENA (Alternate)	
SHRI P. G. BHATT	Flexicons Ltd, Bombay
SHRI B. G. BHATT (Alternate)	
SHRI N. T. GEORGE	Powder Metallurgy Association of India, Hyderabad
SHRI ANUP CHANDRA (Alternate)	
SHRI T. R. GUPTA	India Hard Metals Ltd, Calcutta
SHRI K. C. MITTAL (Alternate)	
SHRI A. K. HAZRA	Ministry of Defence (DGI)
SHRI R. N. PAUL (Alternate)	
SHRI B. M. KATARIA	Mahindra Sintered Products Ltd, Pune
SHRI K. KESAVAN	The Metal Powder Co Ltd, Thirumangalam
DR P. R. KRISHNAMURTHY	Bharat Heavy Electricals Ltd, Hyderabad
SHRI G. K. RAJHANS	Mishra Dhatu Nigam Ltd, Hyderabad
SHRI K. RAMESH (Alternate)	
SHRI T. RAMASUBRAMANIAN	Directorate General of Technical Development, New Delhi
SHRI Y. H. RAUT (Alternate)	

(Continued on page 2)

© Copyright 1986

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

Members

R E P R E S E N T A T I V E

R E P R E S E N T A T I V E

DR N. P. SANJANA

DR R. M. PARDESHI (*Alternate*)

SHRI ANIL R. SHAH

SHRI B. H. SHETTY (*Alternate*)

SHRI M. J. SHAHANI

SHRI J. P. TIWARI (*Alternate*)

SHRI R. SRINIVASAN

SHRI K. SADANAND (*Alternate*)

SHRI R. SRINIVASAN

SHRI P. V. VASUDEVARAO (*Alternate*)

SHRI K. RAGHAVENDRAN,

Director (*Struc & Met*)

Representing

Small Scale Metal Powder Manufacturing Association,
Bombay

Larsen & Toubro Ltd, Bombay

Sandvik Asia Ltd, Pune

Khosla Metal Powders Pvt Ltd, Pune

National Metallurgical Laboratory, Jamshedpur

Widia (*India*) Ltd, Bangalore

Central Electric Chemical Research Institute
(CSIR), Karaikudi

Director General, ISI (*Ex-officio Member*)

Secretary

SHRI JAGMOHAN SINGH

Deputy Director (*Metals*), ISI

Indian Standard

METHOD OF

TEST FOR ACID-INSOLUBLE CONTENT IN IRON, COPPER, TIN AND BRONZE POWDERS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 November 1985, after the draft finalized by Powder Metallurgical Materials and Products Sectional Committee had been approved by the Structural and Metal Division Council.

0.2 This standard was first published in 1974. While reviewing the standard in the light of the experience gained during the years, the Sectional Committee decided to revise the standard. In this revision the test method for tin and bronze powders, have been included and the standard has been made in line with International Standard.

0.3 The insoluble matter referred to is generally considered to be acid-insoluble silica and silicates, carbides, alumina, clays or other refractory oxides which are either present in the raw material from which the powders are manufactured or introduced during the manufacturing process.

0.4 In the formulation of this standard, assistance has been derived from ISO 4496-1978 'Metallic powders — Determination of acid insoluble content of iron copper tin and bronze powder,' issued by the International Organization for Standardization (ISO).

0.5 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes the method for the determination of the mineral acid insoluble matter content of iron, copper, tin and bronze powders.

*Rules for rounding off numerical values (revised).

1.2 The method is applicable to lubricant-free powder.

2. PRINCIPLE OF TEST

2.1 The test consists of dissolving the powder in appropriate acid. The insoluble matter is filtered out, washed and ignited in a furnace at $980 \pm 20^\circ\text{C}$.

3. SAMPLING

3.1 The sampling shall be done in accordance with IS : 6492-1972*.

4. QUALITY OF REAGENTS

4.1 During the analysis, use only reagents of recognized analytical grade, and only distilled water or water of equivalent purity.

5. DETERMINATION OF ACID-INSOLUBLE MATTER OF IRON POWDER

5.1 Reagents

5.1.1 *Hydrochloric Acid* — 1 : 1 and 1 : 25 (*v/v*).

5.2 Procedure

5.2.1 Weigh a 5 g sample of the powder to the nearest 1 mg and transfer to a glass beaker. Carefully add 100 ml of hydrochloric acid (1 : 1) and let it stand at room temperature until the reaction is complete (no further evolution of hydrogen).

NOTE — If it is desired to exclude carbides from the reported insoluble matter, add 20 ml of concentrated nitric acid to hydrochloric acid (1 : 1).

5.2.2 Heat the solution on a hot plate to boiling. Add 150 ml of water and reheat to boiling and maintain for about 1 minute. Allow the solution to cool and settle for 5 minutes.

5.2.3 Filter the solution through a medium filter paper (for example, Whatman 40) and wash the residue alternately with hot hydrochloric acid (1 : 25) and hot water. Repeat the washing until the residue is free of iron salts.

5.2.4 Transfer the filter paper and residue to a fused silica or porcelain crucible which had been preheated to constant mass at $980 \pm 20^\circ\text{C}$ and weighted to the nearest 0.1 mg. Ignite the residue in a furnace at a temperature $980 \pm 20^\circ\text{C}$ for one hour. Cool in a desiccator and re-weigh. Ignite again and ensure that the difference between two consecutive weighings of the crucible with the residue after cooling is not greater than 0.1 mg.

*Methods for sampling of powders for powder metallurgical purposes.

5.3 Calculation — The acid insoluble content
(percent by mass) $= \frac{m_3 - m_2}{m_1} \times 100$

where

m_1 = mass in g of the sample,

m_2 = mass in g of empty crucible, and

m_3 = mass in g of the crucible with residue.

6. DETERMINATION OF ACID-INSOLUBLE CONTENT OF TIN, COPPER AND BRONZE POWDERS

6.1 Reagents

6.1.1 Dilute Nitric Acid — 1 : 1 (v/v).

6.1.2 Concentrated Hydrochloric Acid — rd = 1.16 (conforming to IS : 265-1976*).

6.1.3 Ammonium Acetate Solution — 20 percent (w/v).

6.2 Procedure

6.2.1 Weigh a 5 g sample of the powder to the nearest 1 mg and transfer it to a glass beaker carefully. Add 50 ml of concentrated hydrochloric acid. Cover it with a watch glass and digest at low temperature for a minimum of 30 minutes by placing the beaker on a hot sand bath.

6.2.2 Remove the beaker, and cool it at room temperature. Add carefully 50 ml of dilute nitric acid. Wait for the initial reaction, which starts in about 10 minutes. After the initial reaction is complete, add 50 ml of more dilute nitric acid. Boil the solution until the volume is reduced to one half. Gradually add 50 ml of hot water and boil for about 1 minute. Allow the solution to cool and settle for 5 minutes.

6.2.3 Filter the solution through a medium filter paper (for example, Whatman 40) and wash the residue first with hot concentrated hydrochloric acid and finally with hot water. If the presence of lead salt is suspected, wash at least twice with a hot ammonium acetate and then with water.

6.2.4 Repeat the washing with water until copper or tin salts are not detected in the washing (copper can be detected by 4 percent sodium diethyl dithio carbamate solution and tin may, be detected by hydrogen sulphide or sodium sulphide).

*Specification for hydrochloric acid (second revision).

6.2.5 Transfer the filter paper with residue to a fused silica or porcelain crucible which had been preheated to constant mass at $980 \pm 20^{\circ}\text{C}$ and weighed to the nearest 0.1 mg. Place the crucible on a hot plate to dry and char the paper. Ignite in the furnace at a temperature $980 \pm 20^{\circ}\text{C}$ for one hour. Cool in a desiccator and reweigh. Ignite again and ensure that the difference between two consecutive weighings of the crucible with residue after cooling is not greater than 0.1 mg.

6.3 Calculation

$$\begin{array}{l} \text{The acid soluble content,} \\ \text{(percent by mass)} \end{array} = \frac{m_3 - m_2}{m_1} \times 100$$

where

m_1 = mass in g of the sample,

m_2 = mass in g of empty crucible, and

m_3 = mass in g of the crucible with residue.

6.4 Calculate the result of each determination to the nearest 0.01 percent.

7. TEST REPORT

7.1 The test report shall include the following information:

- a) reference to this standard;
- b) all details necessary for identification of the test sample;
- c) the result obtained; and
- d) details of any occurrence which may have affected the test result.



INDIAN STANDARDS INSTITUTION

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 0131 331 1375

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices:

Telephone

*Western : Manakalaya, E9 MIDC, Marol Andheri (East) 6 32 92 95
BOMBAY 400093

†Eastern : 1/14 C. I. T. Scheme VII M. V. I. P. Road, 36 24 99
Maniktola, CALCUTTA 700054

Northern : SCO 445-446, Sector 35-C { 2 18 43
CHANDIGARH 160036 { 3 16 41

Southern : C. I. T. Campus, MADRAS 600113 { 41 24 42
{ 41 25 19
{ 41 29 16

Branch Offices:

‘Pushpak’, Nurmohamed Shaikh Marg, Khanpur { 2 63 48
AHMADABAD 380001 { 2 63 49

‘F’ Block, Unity Bldg, Narasimharaja Square, 22 48 05
BANGALORE 560002

Gangotri Complex, 5th Floor, Bhadbhada Road, 6 67 16
T. T. Nagar, BHOPAL 462003

Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002 5 36 27

53/5 Ward No 29, R. G. Barua Road, 5th Byelane,
GUWAHATI 781003 —

5-8-56C L. N. Gupta Marg, HYDERABAD 500001 22 10 83

R14 Yudhister Marg, C Scheme, JAIPUR 302005 { 6 34 71
{ 6 98 32

117/418 B Sarvodaya Nagar, KANPUR 208005 { 21 68 76
{ 21 82 92

Patliputra Industrial Estate, PATNA 800013 6 23 05

Hantex Bldg (2nd Floor), Rly Station Road, 52 27
TRIVANDRUM 695001

Inspection Office (With Sale Point):

Institution of Engineers (India) Building, 1332 Shivaji Nagar, 5 24 35
PUNE 411005

*Sales Office in Bombay is at Novelty Chambers, Grant Road, 89 65 28
BOMBAY 400007

†Sales Office in Calcutta is at 5 Chowringhee Approach, 27 68 00
P.O. Princep Street, CALCUTTA 700072